



Matt Gold System with Bright Precious Metal Preparations for Porcelain, Bone China and Earthenware

1 General Information

The Heraeus Matt Gold System allows for a cost saving production of decals with combined bright and silk matt precious metal decorations. A bright gold or bright platinum paste is printed typically partially on top of an underlay partially directly onto the substrate. On top of the underlay the bright precious metal layer shows a silk matt surface after firing, directly on top of the glaze the metal shows a bright surface.

Crucial for the quality of a decoration produced according the Heraeus Matt Gold System is:

- the optimum combination of the necessary components of the system, the underlay, the special medium for the pasting of the underlay and the selected precious metal paste. Heraeus offers special products as basis for an excellent firing result of Heraeus Matt Gold System decoration.
- the exact processing of the materials as described in this technical information sheet.
- a number of factors in connection with firing of Matt Gold System decorations, such as firing cycle, position of the fired substrates in the kiln, the exhaust air system in the kiln etc.

Important processing steps which will help to get a satisfactory fired result of an Heraeus Matt Gold System decoration are described as follows.

2 Production

2.1 Preparation of the underlay

Pasting of the underlay with the special medium. We recommend the following mixing ratios for pasting of the underlay:

- Lead free underlays: 100 : 45-55 (Underlay : Medium)
- Low lead releasing underlay: 100 : 35-40 (Underlay : Medium)
- Lead containing underlays: 100 : 35-40 (Underlay : Medium)

The mixed underlay paste has to be homogenised with a triple roll mill. The triple roll mill optimises the colour dispersion. The underlay must be prepared freshly for every printing session and should be consumed immediately.

2.2 Printing of the decal

- Printing of the pasted special underlay using a 130-34 – 150-31 polyester screen.
Important note! Do not print special underlay for reserve stocks! It is not possible to store decals printed with a special underlay in order to print the bright gold paste at a later date. Generally, fresh preparations should be used!
- Drying of the underlay.



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At room temperature (c. 20°C/68°F) the drying will take at least 3 to 4 hours, maximum 24 hours. The underlay is ready for the print of the precious metal on top, if the surface of the underlay is dried to touch. The underlay should not be dried right through. As a rule, it should not be possible to smear the underlay by hand.

- Printing of the bright gold paste using a 120-34 – 130-34 polyester screen. Important: After printing the screen should be cleaned with screen cleaner V 34 immediately.
- Leave to dry the gold layer.
- Printing of further colours, if required and leave to dry.
- Printing of the covercoat L 406. We recommend the use of a 24HD to 32HD (60 to 83 mesh) polyester screen. The finished decals should not be stored too long before use.

2.3 Transfer of the decal onto the substrate

The following information should be considered when applying the decal onto the object:

- The applied decal needs to be pressed well onto the decorated article. A squeegee or a several times folded piece of cloth can be used to press the decal onto the substrate.
- Excessive stretching of the decal should be avoided.
- The objects to be decorated and the decals themselves should be completely clean. Any contamination will inflict the fired decoration. Especially rests of paper glue on top of the applied decal should be washed off before firing.
- The applied decal should dry for at least 3 hours before firing.

2.4 Firing of the applied decal

The firing conditions of a decorated article are of immense importance for a good firing result of the decal. Besides the right combination of products and the correct processing of the decal, various essential factors considerably influence the firing result:

- firing cycle, firing temperature
- number of objects in the kiln
- distance between the objects
- the ventilation in the kiln (removal of exhaust air)
- form of the object
- the position of the decoration on the article
- the glaze of the substrate

Because of the multitude of interdependent factors that influence the fired result, it is not possible to simply describe the optimum firing condition. Some guidelines should be considered in order to achieve a good firing result:

- Platinum decorations are generally "more firing sensitive" than gold decorations. Good ventilation, specifically a fast removal of the exhaust air is an important factor for a good firing result. Furthermore, enough oxygen as well as not too many articles in the kiln are helpful factors for a successful firing.
- Allow the articles to pass the zone with the highest concentration of organic exhaust quickly, so that a good firing result can be achieved.
- Decorations produced according to the Heraeus Matt Gold System react sensitively to high firing temperatures. Especially sensitive are platinum pastes on lead free underlays. Therefore the following firing temperatures should not be exceeded:

Fast firing: 850°C (1562°F)
Normal firing: 800 to 820°C (1472 - 1508°F)

- Take care that the decoration is fired at a temperature within the firing range of the selected underlay. The firing range of the different underlays can be found under section 5 – Products.

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3 Storage of decals

We recommend, using the decals within 3 months after production. We recommend storing the decals at room temperature (c. 20°C / 68°F) and vertically - without any stress on the covercoat layer.

4 Frequent faults, their causes and ways of avoiding them

Fault	Possible Cause	Remedy
Blurring or smearing metal contours.	The special underlay was not dry to touch.	Increase drying time of the underlay. It must be dried to touch when the gold is printed on top.
	The special underlay was pasted with too much medium.	Reduce the parts by weight of medium. Consider mixing ratios.
The underlay chips off.	The special underlay was not dry to touch.	Increase drying time of the underlay. It must be dried to touch when the gold is printed on top.
The decal is brittle and tears apart during the application.	Decal was stored for too long.	Observe instructions for max. storage. Check storage conditions.
Inhomogeneous surface of the decoration.	Special underlay was not sufficiently homogenized.	Homogenize the paste with a triple roll mill.
Pinholes in the fired decoration.	Not enough medium was mixed with the underlay.	Increase the amount of medium used. Consider mixing ratios.
	Special underlay was not sufficiently homogenized.	Homogenize the paste with a triple roll mill.
Cracks in the fired decoration.	The underlay was printed in a too thick layer.	Use a finer screen. Please follow the screen recommendations.
	Use of an unsuitable precious metal preparation for the glaze of the decorated substrate.	Please follow our product recommendations in section 5.
	Decal was over stretched.	Do not stretch the decal too much.
	Steeping water was too cold and/or the decal was transferred onto a cold object.	Steeping water should be warmed up a little. It is particularly recommended to warm up the object to be decorated eg. with an infrared radiator.
Low mechanical resistance of the precious metal decoration.	Firing temperature is too low.	Increase the firing temperature.
	The printed layer of the product is too thin / too much thinner was used.	We recommend printing the precious metal paste with a 120T to 140T polyester screen.
The precious metal decoration bordering to the underlay shows a hazy surface.	Decoration was fired in a fast firing cycle and the selected underlay and precious metal paste did not fit to this procedure.	For fast firing we recommend the use of the underlays H 5234 and H 55033. Please consider our product recommendations in section 5.
	<ul style="list-style-type: none"> • Firing temperature was too high. • Soak time was too long. 	<ul style="list-style-type: none"> • Reduce the peak firing temperature • Reduce the soak time • Reduction of the total firing cycle.

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Fault	Possible cause	Avoidance
Spotty precious metal surface on top of the underlay.	Unsuitable product combination was used.	Test an alternative underlay resp. precious metal preparation.
	Precious metal paste was printed orange skinny.	Take care to print the precious metal paste smoothly. Check your printing condition (squeegee).
Flaking	Special underlay was mixed with an unsuitable medium.	Use special medium Nr. 238.
	Special underlay was dried through.	Shorten the drying time. Please follow the instructions on drying the special underlay.
	Decals were printed with a special underlay then stored and printed with the bright gold paste at a later date.	Do not print special underlay for reserve stocks.
	Substrate was not clean.	Clean the object before decorating.
	Water or air bubbles under the decal.	Press decal carefully with squeegee and leave to dry.
	The printed layer of the product is too thick.	Reduce the layer of the product by using a finer screen.
	Reaction with bordering incompatible colours.	Tests with critical colours (eg. red colour shades) should be carried out beforehand.
Stained or dull precious metal surface.	Printed precious metal layer was too thin.	Print thicker precious metal layer. Please follow screen recommendations.
	Unsuitable precious metal product was used.	Please consider product recommendations.
	Problems with the kiln, e.g.: <ul style="list-style-type: none"> • reduced atmosphere in the kiln • insufficient ventilation • too many objects in the kiln • heat increase is too fast during critical phase between 300 and 400°C (570 and 750°F) • firing temperature was too high 	<ul style="list-style-type: none"> • increase air addition • improve the ventilation • reduce the number of objects in the kiln • reduce the heating speed • reduce the firing temperature, carry out firing tests
	Glue residues on the surface of the decal.	Wipe off the decal with a damp sponge.
Organic components burn off, attack the platinum film and lead to a dull precious metal surface.	Increase air addition in the kiln, reduce the number of objects in the kiln, increase the distance between the objects in the kiln, change the position of the objects in the kiln.	

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5 Products

Precious Metal Preparations for Porcelain

Colour	Product	Precious Metal Content	Remarks
light yellow	GGP 2538	10+12%	lemon yellow firing result
light yellow	GGP 1215	10+12%	lemon yellow firing result
light yellow	GGP 1213	10+12%	-
yellow	GGP 2536	10+12%	-
yellow	GGP 2572	10%	-
yellow	GG 5566	10%	-
reddish yellow	GGP 1220	10+12%	-
white	GPP 1241	11%	-
white platinum	GPP 4520	10%	-
white platinum	GPP 1240	8%	-
white platinum	GPP 4530	8%	-
platinum	GP 5566	8%	-
platinum	GP 5530	7%	-
platinum	GP 5590	7%	-

Precious Metal Preparations for Bone China

Colour	Product	Precious Metal Content	Remarks
yellow	GGP 2536	10+12%	on soft glazes only suitable for firing range 780-800°C
yellow	GGP 1211	10+12%	-
reddish yellow	GGP 1220	10+12%	-
reddish yellow	GGP 2335	12%	-

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Colour	Product	Precious Metal Content	Remarks
white platinum	GPP 1240/3	8%	-
platinum	GPP 4319	12%	-
platinum	GPP 4308	8%	-
platinum	GPP 4512	8%	-

Underlays

Number of Colour	Name of Colour	Firing Temperature approx.	Appearance after Firing	Contains silver	Lead free	Cadmium free	resistent DIN EN 1388-1-2	Remarks
H 5231	white	800-820°C	half matt					-
H 5232	white	830-850°C	matt					-
H 5234	white	800-850°C	matt				●	-
H 55031	white	800-820°C	matt		●	●	●	-
H 55032	white	830-850°C	matt		●	●	●	-
H 55033	white	820-850°C	matt		●	●	●	-

Auxiliary Materials

Screen Printing Medium	Viscosity ¹⁾	Solids content approx.	Thinner	Porcelain	Bone China	Vitreous China	Earthenware	Glass	Enamel	Remarks
Nr. 238	55-65 / 3 mm	50%	V 63	●	●	●	●	●	●	-

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Covercoat	Block resistance	Viscosity ¹⁾	Thinner	Solids content approx.	Porcelain	Bone China	Vitreous China	Earthenwrae	Glass	Enamel	Remarks
L 406	Not block resistant	95-105 / 6 mm	V 41	42%	●	●	●	●	●	●	Interleaving paper necessary

1) flow time in seconds measured in a DIN cup, temperature approx. 20°C

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